



# PBR Recursive Next Hop

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**Last Updated: April 30, 2012**

The PBR Recursive Next Hop feature enhances route maps to enable configuration of a recursive next-hop IP address that is used by policy-based routing (PBR). The recursive next-hop IP address is installed in the routing table and can be a subnet that is not directly connected. If the recursive next-hop IP address is not available, packets are routed using a default route.

Because Cisco Express Forwarding (CEF) or process switching provides the infrastructure, the benefit of this feature is the CEF loadsharing.

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

## How to Configure PBR Recursive Next Hop

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# Setting the Recursive Next-Hop IP Address

The infrastructure provided by CEF or process switching performs the recursion to the next-hop IP address. The configuration sequence, which affects routing, is as follows:

- 1 Next-hop
- 2 Next-hop recursive
- 3 Interface
- 4 Default next-hop
- 5 Default interface

If both a next-hop address and a recursive next-hop IP address are present in the same route-map entry, the next hop is used. If the next hop is not available, the recursive next hop is used. If the recursive next hop is not available and no other IP address is present, the packet is routed using the default routing table; it is not dropped. If the packet is supposed to be dropped, use the **set ip next-hop** command with the **recursive** keyword, followed by a **set interface null0** configuration.

Perform this task to set the IP address for the recursive next-hop router.

If loadsharing is required, CEF loadsharing should be configured for per-packet or per-destination loadsharing. Loadbalancing should be done over all equal-cost routes to the subnet that has been configured by the **set ip next-hop recursive** command.

This functionality should be available in centralized and distributed systems.



**Note**

Only one recursive next-hop IP address is supported per route-map entry.

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## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **access-list** *access-list-number* {**deny** / **permit**} *source[source-wildcard]* [**log**]
4. **route-map** *map-tag*
5. **set ip next-hop** ip-address
6. **set ip next-hop** {*ip-address* [...*ip-address*] | **recursive** ip-address}
7. **match ip address** *access-list-number*
8. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>	Enables privileged EXEC mode.
	<b>Example:</b>	<ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
	Router> enable	

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> <pre>Router# configure terminal</pre>	Enters global configuration mode.
<b>Step 3</b>	<b>access-list <i>access-list-number</i> {deny / permit} source[<i>source-wildcard</i>] [log]</b>  <b>Example:</b> <pre>Router(config)# access-list 101 permit 10.60.0.0 0.0.255.255</pre>	Configures an access list. The example configuration permits any source IP address that falls within the 10.60.0.0, 0.0.255.255 subnet.
<b>Step 4</b>	<b>route-map <i>map-tag</i></b>  <b>Example:</b> <pre>Router(config)# route-map abccomp</pre>	Enables policy routing and enters route-map configuration mode.
<b>Step 5</b>	<b>set ip next-hop ip-address</b>  <b>Example:</b> <pre>Router(config-route-map)# set ip next-hop 10.10.1.1</pre>	Sets a next-hop router IP address.  <b>Note</b> Set this IP address separately from the next-hop recursive router configuration.
<b>Step 6</b>	<b>set ip next-hop {<i>ip-address</i> [...<i>ip-address</i>]   recursive ip-address}</b>  <b>Example:</b> <pre>Router(config-route-map)# set ip next-hop recursive 10.20.3.3</pre>	Sets a recursive next-hop IP address.  <b>Note</b> This configuration does not ensure that packets get routed using the recursive IP address if an intermediate IP address is a shorter route to the destination.
<b>Step 7</b>	<b>match ip address <i>access-list-number</i></b>  <b>Example:</b> <pre>Router(config-route-map)# match ip address 101</pre>	Sets an access list to be matched.
<b>Step 8</b>	<b>end</b>  <b>Example:</b> <pre>Router(config-route-map)# end</pre>	Exits route-map configuration mode and returns to privileged EXEC mode.

## Verifying the Recursive Next-Hop Configuration

To verify the recursive next-hop configuration, perform the following steps.

### SUMMARY STEPS

1. `show running-config | begin abccomp`
2. `show route-map map-name`

### DETAILED STEPS

#### Step 1 `show running-config | begin abccomp`

Use this command to verify the IP addresses for a next-hop and recursive next-hop IP address, for example:

##### Example:

```
Router# show running-config | begin abccomp
route-map abccomp permit 10
match ip address 101 ! Defines the match criteria for an access list.
set ip next-hop recursive 10.3.3.3 ! If the match criteria are met, the recursive IP address is
set.
set ip next-hop 10.1.1.1 10.2.2.2 10.4.4.4
```

#### Step 2 `show route-map map-name`

Use this command to display the route maps, for example:

##### Example:

```
Router# show route-map abccomp
route-map abccomp, permit, sequence 10
Match clauses:
ip address (access-lists): 101
Set clauses:
ip next-hop recursive 10.3.3.3
ip next-hop 10.1.1.1 10.2.2.2 10.4.4.4
Policy routing matches: 0 packets, 0 bytes
```

## Configuration Examples for PBR Recursive Next Hop

- [Recursive Next-Hop IP Address Example, page 4](#)

### Recursive Next-Hop IP Address Example

The following example shows the configuration of IP address 10.3.3.3 as the recursive next-hop router:

```
route-map abccomp
set ip next-hop 10.1.1.1
set ip next-hop 10.2.2.2
```

```
set ip next-hop recursive 10.3.3.3
set ip next-hop 10.4.4.4
```

## Additional References

The following sections provide references related to the PBR Recursive Next Hop feature.

### Related Documents

Related Topic	Document Title
IP routing commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	<i>Cisco IOS IP Routing Protocols Command Reference</i>
Cisco IOS master command list, all releases	<a href="#">Cisco IOS Master Command List, All Releases</a>

### MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

### Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.  To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.  Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>

## Feature Information for PBR Recursive Next Hop

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software

release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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**Table 1**      **Feature Information for PBR Recursive Next Hop**

Feature Name	Releases	Feature Information
PBR Recursive Next Hop	Cisco IOS XE Release 2.2	This feature was introduced on the Cisco ASR 1000 Series Aggregation Services Routers.  The following commands were modified by this feature: <b>set ip next-hop</b> , <b>show route-map</b> .

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